AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph beginning on page 1, line 22 as follows:

According to the damascene process, before an interconnect metal such as copper or the like is deposited, a barrier layer of a material such as ~~of~~ TaN, Ta, or the like for preventing copper atoms from being diffused into an insulating film is formed on the surfaces of the substrate and the recesses. Then, if copper is to be deposited by performing electroplating, a seed layer serving as a current supply layer for electroplating is formed on the barrier layer on the surfaces of the substrate and the recesses. The seed layer is generally formed by PVD or CVD. PVD is widely used as it can form a seed layer capable of high adhesion to the barrier layer.

Please amend the paragraph beginning on page 2, line 22 as follows:

It is conceivable that the film thickness of the seed layer may be reduced in order to achieve ~~the enough~~ sufficient area of the opening of the recess. If the film thickness of the seed layer is reduced, however, the film thickness of the seed layer formed on the sidewall of the recess is further reduced, eventually causing other problems in that the seed layer is discontinued and includes a portion whose resistance is extremely large. If electroplating is performed ~~onto~~ on the surface of a substrate having a recess covered with such a discontinuous seed layer, no plated film is deposited on the discontinuous region of the seed layer, tending to form voids, which are in contact with the sidewall of the recess, within the metal that is embedded in the recess.

Please amend the paragraph beginning on page 7, line 7 as follows:

The first plating is performed under plating conditions for a relatively high bottom-up capability, and the second plating is performed under plating conditions for a relatively high leveling capability. The term "relatively" is used here for the reason that the first plating exhibits a certain leveling capability and the second plating exhibits a certain bottom-up capability, and a comparison between these plating processes indicates that the bottom-up capability is higher in the first plating than in the second plating, and the leveling capability is higher in the second plating than in the first plating.

Please amend the paragraph beginning on page 8, line 6 as follows:

According to the above-described method (1), the current density at the time of the first plating is made lower than the current density at the time of the second plating. In this case, it is preferable to use a plating solution containing an additive of a high bottom-up capability as plating solutions for use in the first plating and the second plating. Reducing the current density during the second plating is able to cause the additive to exhibit its bottom-up capability more effectively. It is determined by experimentation or the like how much the current density is to be lowered to increase the bottom-up capability. If a standard copper sulfate plating solution is used, for example, then the current density upon the first plating, which requires the bottom-up capability, is generally in the range from 0.1 to 1.5 A/dm2, and the current density upon the second plating, which requires the leveling capability, is generally in the range from 2 to 7 A/cm2. It is thus possible to make the current density ~~upon~~ during the second plating greater than the current density ~~upon~~ during the first plating for thereby increasing the leveling capability and making the plating rate upon the second plating higher than the plating rate upon the first plating to perform a time-consuming process of filling a metal in broad recesses in a short period of time.

Please amend the paragraph beginning on page 8, line 28 as follows:

After a metal is filled in relatively narrow recesses by performing the first plating, a reverse electric field may be applied for a short period of time, as shown in FIG. 2A, to etch an overplated film on the surfaces of the narrow recesses, thus removing the additive in the overplated film. The period of time for applying the reverse electric field is generally in the range of from 1 to 10 seconds, and preferably from 1 to 4 seconds.

Please amend the paragraph beginning on page 14, line 20 as follows:

The electrode head of the impregnation plating apparatus has the housing 94 coupled to the free end of the swing arm 26 by the ball bearing 92, and the high-resistance structure 110 disposed in closing relation to a lower end opening of the housing 94. The inward protrusion 94a

which projects inwardly is formed at a lower portion of the housing 94, and the flange 110a is formed at an upper portion of the high-resistance structure 110. The flange 110a engages the inward protrusion 94a which, with a spacer 96 interposed between the housing 94 and the high-resistance structure 110, ~~holding~~ holds the high-resistance structure 110 in the housing 94. In this manner, the hollow plating solution chamber 10 is defined in the housing 94.

Please amend the paragraph beginning on page 19, line 6 as follows:

Table 1 below shows the experimental results. With the pattern having the diameter of 0.16 μm, the metal in ~~the~~ a via pattern was void-free only if the concentration of the sulfur-based organic compound was high and the concentration of the organic dye compound was low. With the plating solution containing 20 mg/l of the sulfur-based organic compound and 5 mg/l of the organic dye compound, no voids were observed in the metal at a current value ~~of~~ in ~~the~~ a range of from 0.1 A/dm2 to 1.5 A/dm2, bottom voids were observed in the metal at a current value of 0.1 A/dm2 or less, and top voids were observed in the metal column at a current value in excess of 1.5 A/dm2. At current values in ~~the~~ a range of from 0.1 A/dm2 to 1.5 A/dm2, the bottom-up capability was fine, and pinch-off was suppressed. This means that the bottom-up capability depends on the concentration ratio of both of additives and there is an appropriate current condition. No voids were produced in the metal for the pattern having ~~the~~ a diameter of 0.3 μm.

Please amend the paragraph beginning on page 20, line 6 as follows:

(2) Then, a pattern wafer in which a trench pattern of L/S (line and space: trench width/trench interval) = 0.18 μm/0.18 μm and L/S = 0.3 μm/0.3 μm ~~were~~ was etched in a thermal oxide film having a film thickness of 1.0 μm and a barrier layer and a seed layer were formed thereon was used, and the height of humps produced on a plated film deposited by plating was confirmed. The current passed upon plating was 1.0 A/dm2, the plating time was 280 seconds, and the film was plated to a thickness corresponding to 1 μm in terms of a solid film. Table 2 shows the results. It is understood from Table 2 that the height of humps is small if the

concentration of the sulfur-based organic compound is low and the concentration of the organic dye compound is high.